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HMC344

GaAs MMIC SP4T NON-REFLECTIVE SWITCH, DC - 8.0 GHz

Typical Applications

The HMC344 is ideal for:

- Telecom Infrastructure
- Microwave Radio & VSAT
- Military & Space
- Test Instrumentation

Features

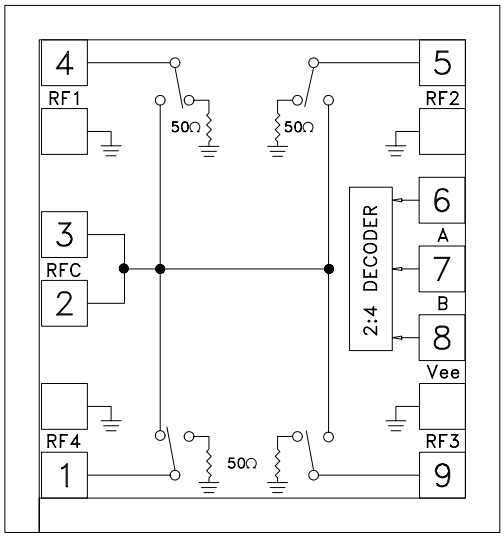
Broadband Performance: DC - 8.0 GHz

Low Insertion Loss: 1.8 dB @ 6.0 GHz

Integrated 2:4 TTL Decoder

Small Size: 1.08 mm x 1.05 mm x 0.10 mm

Functional Diagram



General Description

The HMC344 is a broadband non-reflective GaAs MESFET SP4T switch chip. Covering DC to 8.0 GHz, this switch offers high isolation and low insertion loss and extends the frequency coverage of Hittite's SP4T switch product line. This switch also includes an on board binary decoder circuit which reduces the required logic control lines to two. The switch operates using a negative control voltage of 0/-5V, and requires a fixed bias of -5V. All data is tested with the chip in a 50 Ohm test fixture connected via 0.025 mm (1 mil) diameter wire bonds of minimal length 0.31 mm (12 mils).

Electrical Specifications, T_A = +25° C, With 0/-5V Control, Vee= -5V, 50 Ohm System

Parameter		Frequency	Min.	Typ.	Max.	Units
Insertion Loss		DC - 6.0 GHz DC - 8.0 GHz		1.8 1.9	2.1 2.2	dB dB
Isolation		DC - 2.0 GHz DC - 4.0 GHz DC - 6.0 GHz DC - 8.0 GHz	44 37 34 30	49 42 39 35		dB dB dB dB
Return Loss	"On State"	DC - 2.0 GHz DC - 8.0 GHz	10 7	14 10		dB dB
Return Loss	"Off State"	DC - 8.0 GHz	7	10		dB
Input Power for 1 dB Compression		0.5 - 8.0 GHz	17	21		dBm
Input Third Order Intercept (Two-Tone Input Power= +7 dBm Each Tone)		0.5 - 8.0 GHz	37	40		dBm
Switching Characteristics tRISE, tFALL (10/90% RF) tON, tOFF (50% CTL to 10/90% RF)		DC - 8.0 GHz		 35 150		 ns ns

For price, delivery, and to place orders, please contact Hittite Microwave Corporation:
12 Elizabeth Drive, Chelmsford, MA 01824 Phone: 978-250-3343 Fax: 978-250-3373
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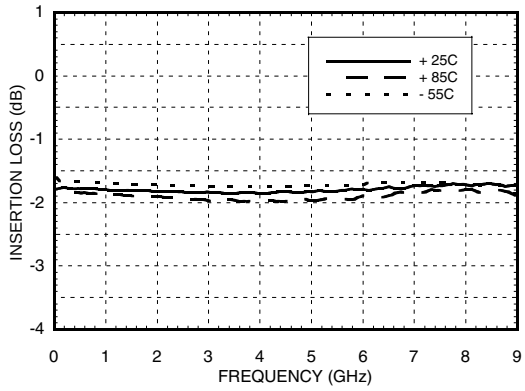
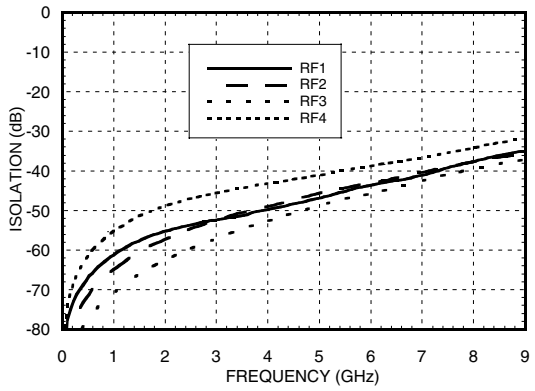
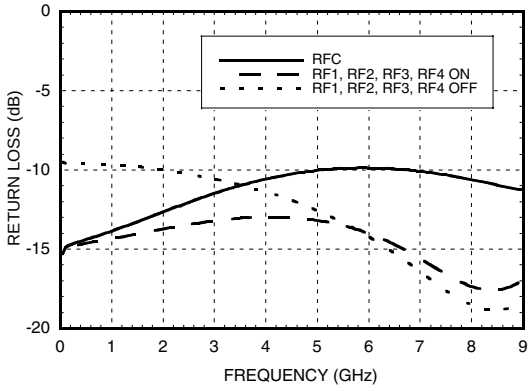
Insertion Loss vs. Temperature



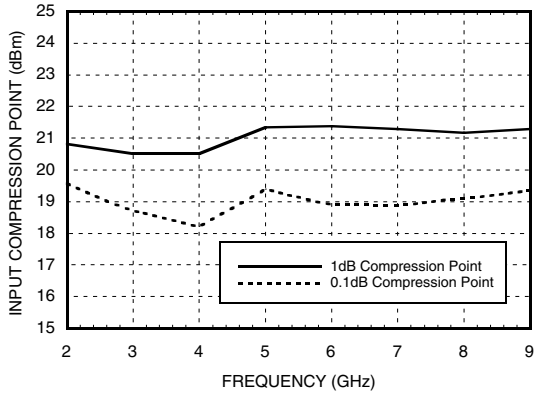
Isolation



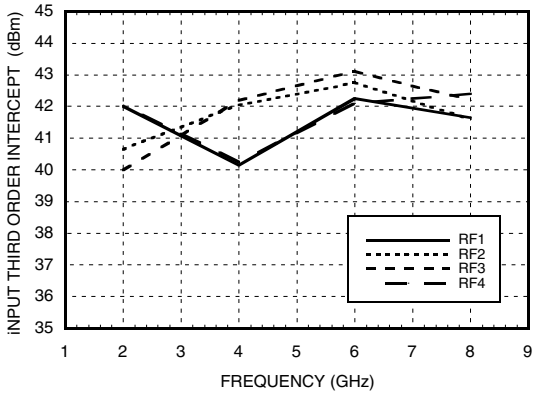
Return Loss



0.1 and 1 dB Input Compression Point



Input Third Order Intercept Point



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Absolute Maximum Ratings

Bias Voltage Range (Vee)	-7.0 Vdc
Control Voltage Range (A & B)	Vee -0.5V to +1.0 Vdc
Channel Temperature	150 °C
Thermal Resistance (Insertion Loss Path)	143 °C/W
Thermal Resistance (Terminated Path)	1,030 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C
Maximum Input Power	+24 dBm

Truth Table

Control Input		Signal Path State
A	B	RF COM to:
High	High	RF1
Low	High	RF2
High	Low	RF3
Low	Low	RF4

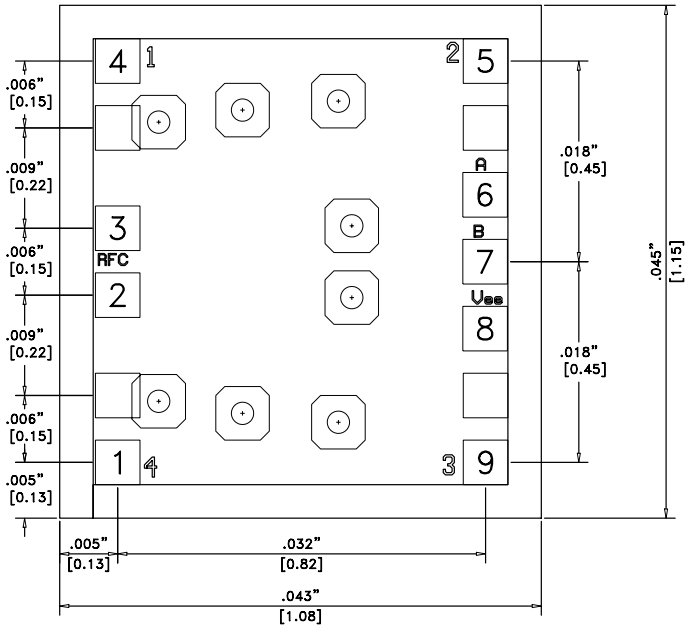
TTL/CMOS Control Voltages

State	Bias Condition
Low	-3V to 0 Vdc @ 60 uA Typ.
High	-5 to 4.2 Vdc @ 5 uA Typ.

Bias Voltage & Current

Vee Range= -5.0 Vdc ±10%		
Vee (Vdc)	Idd (Typ) (mA)	Idd (Max) (mA)
-5.0	3.0	6.0

Outline Drawing



NOTES:

1. DIMENSIONS IN INCHES [MILLIMETERS].
2. DIE THICKNESS IS 0.004".
3. TYPICAL BOND PAD IS 0.004" SQUARE.
4. TYPICAL BOND PAD SPACING IS 0.006" CENTER TO CENTER.
5. BOND PAD METALLIZATION: GOLD.
6. BACKSIDE METALLIZATION: GOLD.
7. BACKSIDE METAL IS GROUND.
8. NO CONNECTION REQUIRED FOR UNLABELED BOND PADS.

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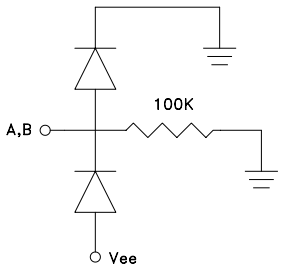
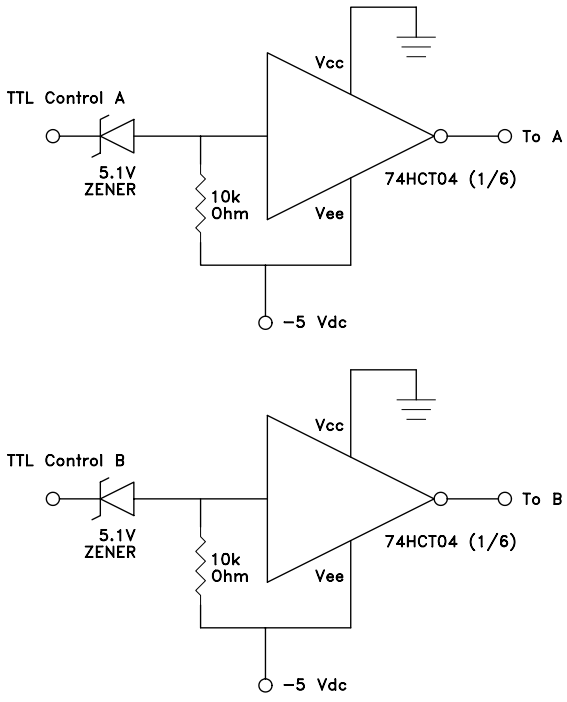
Pad Descriptions

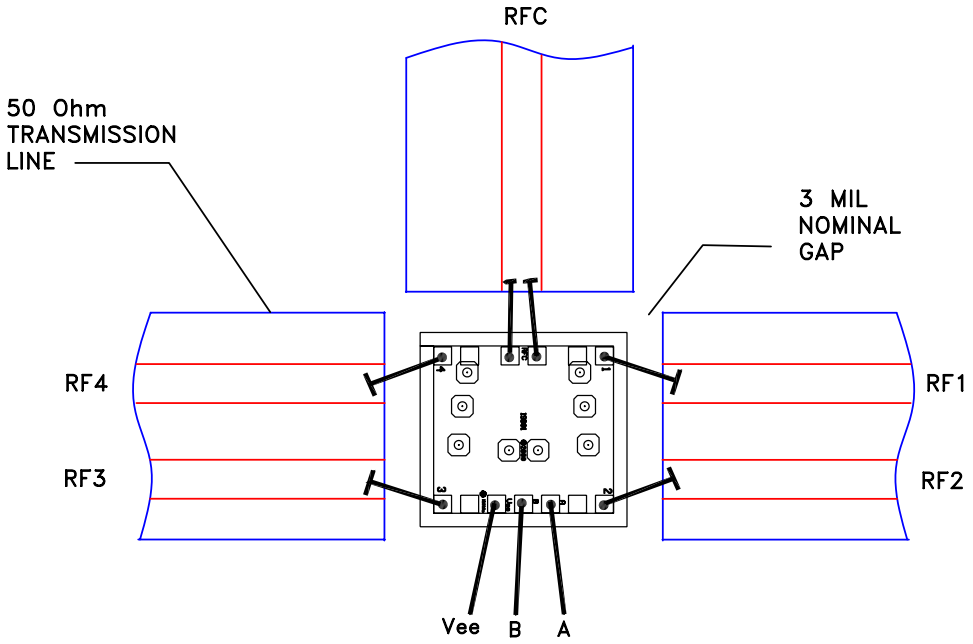
Pad Number	Function	Description	Interface Schematic
1, 2, 3, 4, 5, 9	RF4, RFC, RF1, RF2, RF3	These pads are DC coupled and matched to 50 Ohms. Blocking capacitors are required.	
6	A	See truth table and control voltage table.	
7	B	See truth table and control voltage table.	
8	Vee	Supply Voltage -5.0 Vdc ±10%	
Die Bottom	GND	Die bottom must be connected to RF/DC ground.	

TTL Interface Circuit



Note:
Control inputs A and B can be driven directly with TTL logic with -5 Volts applied to the HCT logic gates Vee pin and to Vee (pad) of the RF Switch.

Assembly Diagram



Handling Precautions

Follow these precautions to avoid permanent damage.

Cleanliness: Handle the chips in a clean environment. DO NOT attempt to clean the chip using liquid cleaning systems.
Static Sensitivity: Follow ESD precautions to protect against > ± 250V ESD strikes.
Transients: Suppress instrument and bias supply transients while bias is applied. Use shielded signal and bias cables to minimize inductive pick-up.
General Handling: Handle the chip along the edges with a vacuum collet or with a sharp pair of bent tweezers. The surface of the chip has fragile air bridges and should not be touched with vacuum collet, tweezers, or fingers.

Mounting

The chip is back-metallized and can be die mounted with AuSn eutectic preforms or with electrically conductive epoxy. The mounting surface should be clean and flat.

Eutectic Die Attach: A 80/20 gold tin preform is recommended with a work surface temperature of 255 deg. C and a tool temperature of 265 deg. C. When hot 90/10 nitrogen/hydrogen gas is applied, tool tip temperature should be 290 deg. C. DO NOT expose the chip to a temperature greater than 320 deg. C for more than 20 seconds. No more than 3 seconds of scrubbing should be required for attachment.
Epoxy Die Attach: Apply a minimum amount of epoxy to the mounting surface so that a thin epoxy fillet is observed around the perimeter of the chip once it is placed into position. Cure epoxy per the manufacturer's schedule.

Wire Bonding

Ball or wedge bond with 0.025mm (1 mil) diameter pure gold wire. Thermosonic wirebonding with a nominal stage temperature of 150 deg. C and a ball bonding force of 40 to 50 grams or wedge bonding force of 18 to 22 grams is recommended. Use the minimum level of ultrasonic energy to achieve reliable wirebonds. Wirebonds should be started on the chip and terminated on the package or substrate. All bonds should be as short as possible <0.31mm (12 mils).

Notes: